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**REMARKS**

Prior to the present amendment and response, claims 24-25, 30-44, and 46-48 were pending in the present application. By the present amendment, independent claims 24, 31, and 37 have been amended. Thus, claims 24-25, 30-44, and 46-48 remain in the present application. Reconsideration and allowance of pending claims 24-25, 30-44, and 46-48 in view of the above amendments and the following remarks are requested.

**A. Rejection of Claims 24-25, 30-44, and 46-48 under 35 USC §103(a)**

The Examiner has rejected claims 24-25, 30-44, and 46-48 under 35 USC § 103(a) as being anticipated by U.S. patent number 6,013,939 to El-Sharawy et al. (hereinafter “El-Sharawy”) in view of U.S. patent number 6,287,932 to Forbes et al. (hereinafter “Forbes”) and Figure 1 of the present application. For the reasons discussed below, Applicants respectfully submit that the present invention, as defined by amended independent claims 24, 31, and 37, is patentably distinguishable over El-Sharawy, Forbes, and Figure 1 of the present application, either singly or in combination thereof.

The present invention, as defined by amended independent claim 24, recites, among other things, a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness. As disclosed in the

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present application, in one embodiment of the invention, a first area of a dielectric, such as a low-k dielectric, is covered with a mask while a second area of the dielectric, which includes a patterned conductor, is not covered with the mask. As shown in Figure 3B of the present application, the first and second areas of the dielectric (e.g. dielectrics 303 and 302, respectively) and the conductor (e.g. metal turns 304, 306, 308, and 310 of inductor 300) have the same thickness.

As disclosed in the present application, by interspersing a permeability conversion material within the unmasked second area of the dielectric (e.g. dielectric 302), the permeability of the second area of the dielectric is increased while the permeability of the first area of the dielectric (e.g. dielectric 303) remains unchanged. As disclosed in the present application, ion implantation can be used to intersperse the permeability conversion material in the second area of the dielectric, for example. Thus, by preventing permeability conversion material from being interspersed in a masked area of a dielectric layer while allowing permeability conversion material to be interspersed in an unmasked area of the dielectric layer that includes an inductor (i.e. a patterned conductor), the present invention can advantageously increase the inductance of the inductor without undesirably increasing the size of the inductor.

In contrast to the present invention as defined by amended independent claim 24, El-Sharawy does not teach, disclose, or suggest a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the

second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness. El-Sharawy specifically discloses monolithic inductor 20 including center coil region 36, which includes insulative layer 30, magnetic material layer 32, insulative layer 30, and insulative layer 34, and metal layers 28 and 40, which are situated over and under center coil region 36, respectively. *See*, e.g., Figure 1 and related text of El-Sharawy. In El-Sharawy, conductive plugs 38 extend through center coil region 36 of inductor 20 and electrically connect metal layers 28 and 40. *See*, e.g., Figure 1 and related text of El-Sharawy.

However, as clearly shown in Figure 1 of El-Sharawy, magnetic material layer 32, which includes magnetic material, has a different thickness than conductive plugs 38. Thus, El-Sharawy fails to teach, disclose, or remotely suggest a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness, as specified by amended independent claim 24.

In contrast to the present invention as defined by amended independent claim 24, Forbes does not teach, disclose, or suggest a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the

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second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness. Forbes specifically discloses inductor 200 coupled to device 210, where inductor 200 includes inductor pattern 230. *See*, e.g., column 4, lines 17-20 and Figure 2 of Forbes.

On page 3 of the Office Action dated November 4, 2005, the Examiner states that “Forbes et al. teach in Figure 2 and related text a first area of dielectric (the white area located above device 210 and surrounding inductor 210) having a first permeability, wherein said first area of said dielectric is not situated underneath a second area of said dielectric (the second area of dielectric is the area where inductor 200 is formed) and not situated over the second area of said dielectric.” However, as is clearly shown in Figure 2 of Forbes, the first area of the dielectric, the second area of the dielectric, and inductor pattern 230 do not have the same thickness. Thus, Forbes fails to teach, disclose, or remotely suggest a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness, as specified by amended independent claim 24. Thus, Forbes fails to cure the basic deficiencies of El-Sharawy discussed above.

On page 3 of the Office Action dated November 4, 2005, the Examiner has cited Figure 1 and related text of the present application to teach "a first area of dielectric 102 comprising silicon oxide and having a first permeability, surrounding the inductor." However, Figure 1 of the present application fails to teach, disclose, or remotely suggest a conductor patterned in a second area of a dielectric, where the dielectric is a low-k dielectric, a permeability conversion material interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, where the first and second areas of the dielectric and the conductor have a same thickness, as specified by amended independent claim 24. Thus, the combination of Forbes and Figure 1 of the present application fails to cure the basic deficiencies of El-Sharawy discussed above. Thus, Applicants respectfully submit that the combination of El-Sharawy, Forbes, and Figure 1 of the present application suggested by the Examiner does not and cannot result in the present invention as specified in amended independent claim 24.

For the foregoing reasons, Applicants respectfully submit that the present invention, as defined by amended independent claim 24, is not taught, disclosed, or suggested by El-Sharawy and Forbes. Thus, amended independent claim 24 is patentably distinguishable over El-Sharawy and Forbes. As such, claims 25 and 30 depending from amended independent claim 24 are, *a fortiori*, also patentably distinguishable over El-Sharawy and Forbes for at least the reasons presented above and also for additional limitations contained in each dependent claim.

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The present invention, as defined by amended independent claim 31, recites, among other things, an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. The present invention, as defined by amended independent claim 31, provides similar advantages as discussed above in relation to the present invention as defined by amended independent claim 24.

In contrast to the present invention as defined by amended independent claim 31, El-Sharawy does not teach, disclose, or suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. As discussed above, El-Sharawy specifically discloses magnetic material layer 32, which is formed from a thin film ferromagnetic or ceramic composite magnetic material, conductive plugs 38, which extend through center coil region 36 and electrically contact conductive layer 28 situated below center coil region 36, and conductive layer 40, which is situated above center coil region 36. However, El-Sharawy fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the

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dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31.

In contrast to the present invention as defined by amended independent claim 31, Forbes does not teach, disclose, or suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. As discussed above, Forbes specifically discloses inductor 200 coupled to device 210, where inductor 200 includes inductor pattern 230. However, Forbes fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31. Thus, Forbes fails to cure the basic deficiencies of El-Sharawy discussed above.

As discussed above, Figure 1 and related text of the present application merely discloses a first area of dielectric 102 comprising silicon oxide and surrounding an inductor. However, Figure 1 of the present application fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a

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first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31.

For the foregoing reasons, Applicants respectfully submit that the present invention, as defined by amended independent claim 31, is not taught, disclosed, or suggested by El-Sharawy and Forbes. Thus, amended independent claim 31 is patentably distinguishable over El-Sharawy and Forbes. As such, claims 32-36 depending from amended independent claim 31 are, *a fortiori*, also patentably distinguishable over El-Sharawy and Forbes for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Amended independent claim 37 includes similar limitations as amended independent claim 24. Also, as discussed above, Figure 1 of the present application merely discloses a first area of dielectric 102 comprising silicon oxide and surrounding an inductor. However, Figure 1 of the present application fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 37. Thus, Applicants respectfully submit that amended independent claim 37 is also patentably distinguishable



over El-Sharawy and Forbes. As such, claims 38-44 and 46-48 depending from amended independent claim 37 are, *a fortiori*, also patentably distinguishable over El-Sharawy and Forbes for at least the reasons presented above and also for additional limitations contained in each dependent claim.

**B. Rejection of Claims 31-36 under 35 USC §103(a)**

The Examiner has rejected claims 31-36 under 35 USC §103(a) as being unpatentable over Japanese patent number JP 402262308A by Tetsuya Yokogawa (hereinafter “Yokogawa”) in view of U.S. patent number 6,069,397 to Cornett et al. (hereinafter “Cornett”) and U.S. patent number 5,446,311 to Ewen et al. (hereinafter “Ewen”). For the reasons discussed below, Applicants respectfully submit that the present invention, as defined by amended independent claim 31, is patentably distinguishable over Yokogawa, Cornett, and Ewen, singly or in any combination thereof.

In contrast to the present invention as defined by independent claim 31, Yokogawa does not teach, disclose, or suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. Yokogawa specifically discloses inductor 2, which includes spiral type coil 3 sandwiched between insulating layers 4. See, for example, the constitution and Figures 1 and 2 of Yokogawa. On page 6 of the Office Action dated

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November 4, 2005, the Examiner designates a first area of dielectric 4 to be located above the white dielectric layer in the center of the structure and a second area of dielectric to be the white dielectric area located in between inductor 3 and having a second permeability.

However, as clearly shown in Figure 2 of Yokogawa, dielectric 4 and spiral type coil 3 have different thicknesses. Thus, Yokogawa fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31.

In contrast to the present invention as defined by amended independent claim 31, Cornett does not teach, disclose, or suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. Cornett specifically discloses inductor layer 220 including patterned conductive trace 110, which is embedded within magnetic material layers 221 and 223. See, for example, column 2, lines 18-21 and Figure 2 of Cornett. However, Cornett fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric,

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where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31. Thus, Cornett fails to cure the basic deficiencies of Yokogawa as discussed above.

In contrast to the present invention as defined by amended independent claim 31, Ewen does not teach, disclose, or suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness. Ewen is cited by the Examiner to teach a passivation/dielectric layer comprising silicon oxide. However, Ewen fails to teach, disclose, or remotely suggest an inductor comprising a conductor patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the conductor comprises a plurality of metal turns, and where the dielectric and the plurality of metal turns of the conductor have a same thickness, as specified in amended independent claim 31. Thus, Ewen combined with Cornett fails to overcome the deficiencies of Yokogawa as discussed above.

For the foregoing reasons, Applicants respectfully submit that the present invention as defined by amended independent claim 31 is not suggested, disclosed, or taught by Yokogawa, Cornett, and Ewen, either singly, or in any combination thereof.

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Thus, amended independent claim 31 is patentably distinguishable over Yokogawa, Cornett, and Ewen. As such, claims 32-36 depending from amended independent claim 31 are, *a fortiori*, also patentably distinguishable over Yokogawa, Cornett, and Ewen for at least the reasons presented above and also for additional limitations contained in each dependent claim.

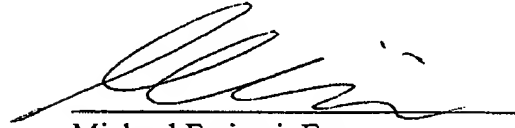
### C. Conclusion

Based on the foregoing reasons, the present invention, as defined by amended independent claims 24, 31, and 37, and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 24-25, 30-44, and 46-48 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early allowance of claims 24-25, 30-44, and 46-48 pending in the present application is respectfully requested.

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Respectfully Submitted,  
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